

SBC35-CC405 User Manual



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Revision History

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Introduction

The SBC35-CC405 is a high-performance, industrial, small form factor (SFF) Single Board Computer (SBC) capable of operating at very high temperatures without a fan or heat-pipe. The processor for the unit is an Intel E3800 series Atom, integrated into the SBC35-CC405 using a Type 6 COM Express module. The low-profile thermal solution provides a rugged platform base that protects the PCB assembly and offers convenient four-point mounting. Information to configure and operate the SBC35-CC405 for most applications is included in this User Manual or on our website at www.winsystems.com.

If additional information is required, call WinSystems Technical Support at (817) 274-7553 and speak with one of our Application Engineers; they are available M-F, 8 AM to 5 PM, Central Daylight Time (CDT) for assistance with all of your product requirements.

Specifications

Feature	SBC35-CC405-3815	SBC35-CC405-3827	SBC35-CC405-3845
Processor	Intel® Atom™ E3815	Intel® Atom™ E3827	Intel® Atom™ E3845
Core Speed	1.46 GHz	1.75 GHz	1.91 GHz
Number of Cores	1	2	4
L2 Cache	512 KB	1 MB	2 MB
Graphics	Intel® Gen 7 Graphics Engine		
Graphics Frequency	400 MHz	542/792 MHz (Turbo)	
Virtualization	Hardware based Intel® VT-x		
Operating Systems	Linux, Windows, DOS, and other x86 compatible		
Video Interfaces	<ul style="list-style-type: none">- Up to 2 Active Displays- VGA up to 2560x1536 at 24bpp- Display Port 1.1- LVDS 18 or 24 Bpp		
Memory (RAM)	2, 4, or 8 GB DDR3L SDRAM		
BIOS	Phoenix		
Ethernet	2 Intel® I210 GbE controllers		
Speed	Auto-negotiation for 10/100/1000 Mb/s		
Advanced Features	<ul style="list-style-type: none">- IEEE1588 and IEEE 802.1AS time stamping- IEEE802.Qav Audio-Video Bridging (AVB)- Advanced Power Management (APM) Support- Remote boot		
Storage (Bootable)	<ul style="list-style-type: none">- 1 SATA (2.0) channel- 1 CFAST socket (on back of the board)- 1 mSATA socket (MiniPCIe socket)		
Serial I/O	2 serial ports (RS-232/422/485)		
Bus Expansion	2x MiniPCIe (One supports mSATA, One supports USB 2.0) IO60 (SPI, I ² C, PWM)		
USB	1 USB 3.0 port, 3 USB 2.0 ports, and 1 USB interface @ J14		
Watchdog Timer	Adjustable from 1 second to 255 minute reset		
Audio	HD Audio supported		
Audio Interfaces	<ul style="list-style-type: none">- Display Port 1.1- Line Out, Line In, Mic to 3.5 mm- 7.1 Surround		
Power ¹	+10 to 50V DC input (7W typical/ 9 W Max)	+10 to 50V DC input (7.5W typical/ 10W Max)	+10 to 50V DC input (8.75W typical/ 12W Max)
Mechanical	- Dimensions: 4 x 6.125 x 2.3 inches (102 x 156 x 58 mm)		
Weight	- Weight: 1.40 lbs. (635g) with heat sink		
Operating Temperature Range	-40°C to +85°C (-40°F to +185°F)		
Storage Temperature	-50°C to +95°C (-58°F to +203°F)		

¹ Power consumption estimates are for the SBC35-CC405 only and exclude any external devices.

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Feature	SBC35-CC405-3815	SBC35-CC405-3827	SBC35-CC405-3845
Shock		TBD	
Vibration		TBD	
MTBF		TBD	

1.0 Before You Begin

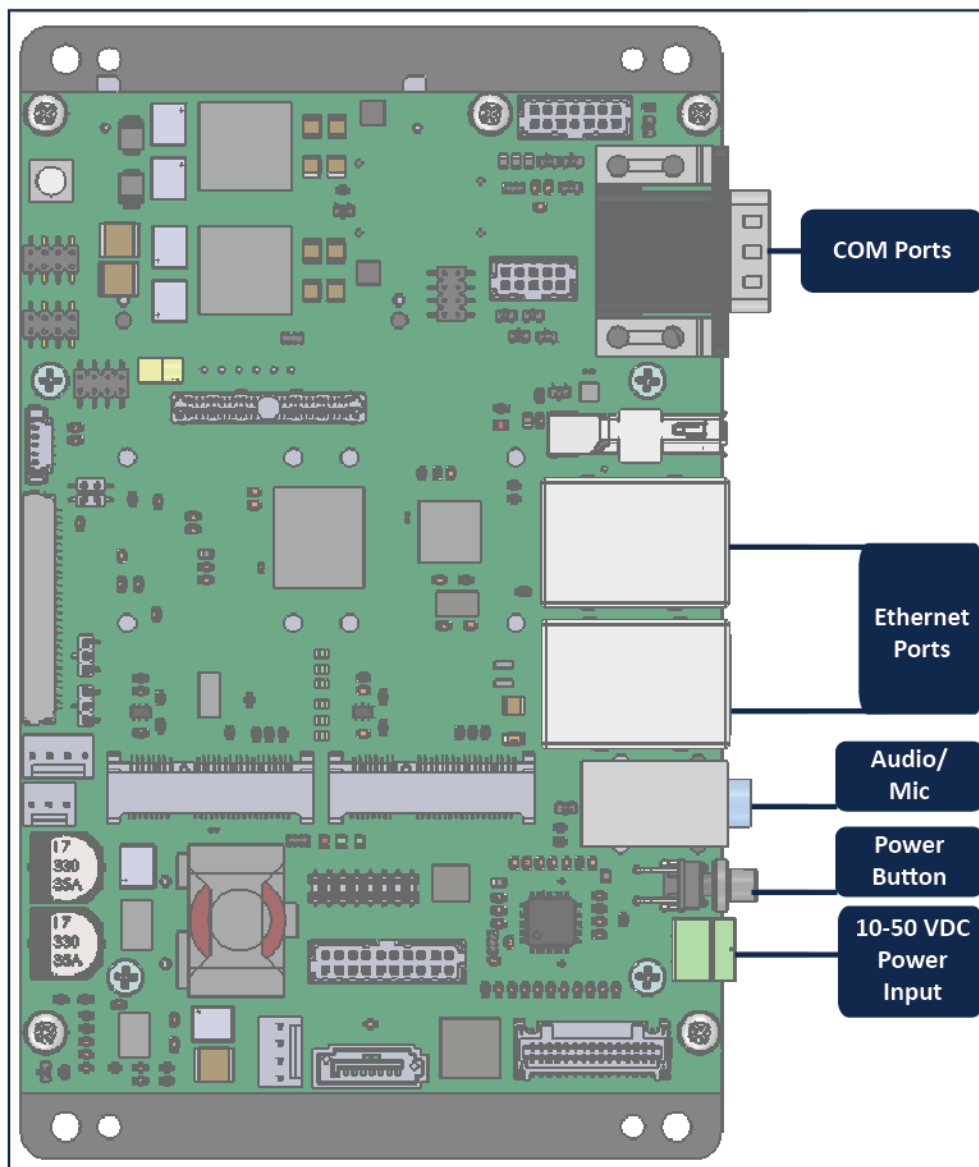
This User Manual provides instructions for optimal performance, prevention of injury, and/or damage to the product. You may VOID the warranty and/or cause damage by neglecting to follow the Best Practices as outlined in [Appendix - A](#).

2.0 Locating Connectors, Switches, and Jumpers

To locate connectors, switches, and jumpers as described on the following pages, place the SBC35-CC405 (component side up) with the serial ports and Ethernet/USB connectors facing to your right (as depicted below). This ensures your view is consistent with the illustrations provided in the pages that follow, which identify physical locations for each connector, switch, and jumper; they also provide brief descriptions of their function and diagrams of pin/jumper configurations where appropriate.



NOTE: To view information on a connector, switch, or jumper, click on its descriptor box; you will jump to a page with more information. To return to the previous location, click on the image or text in the layout section of the table.

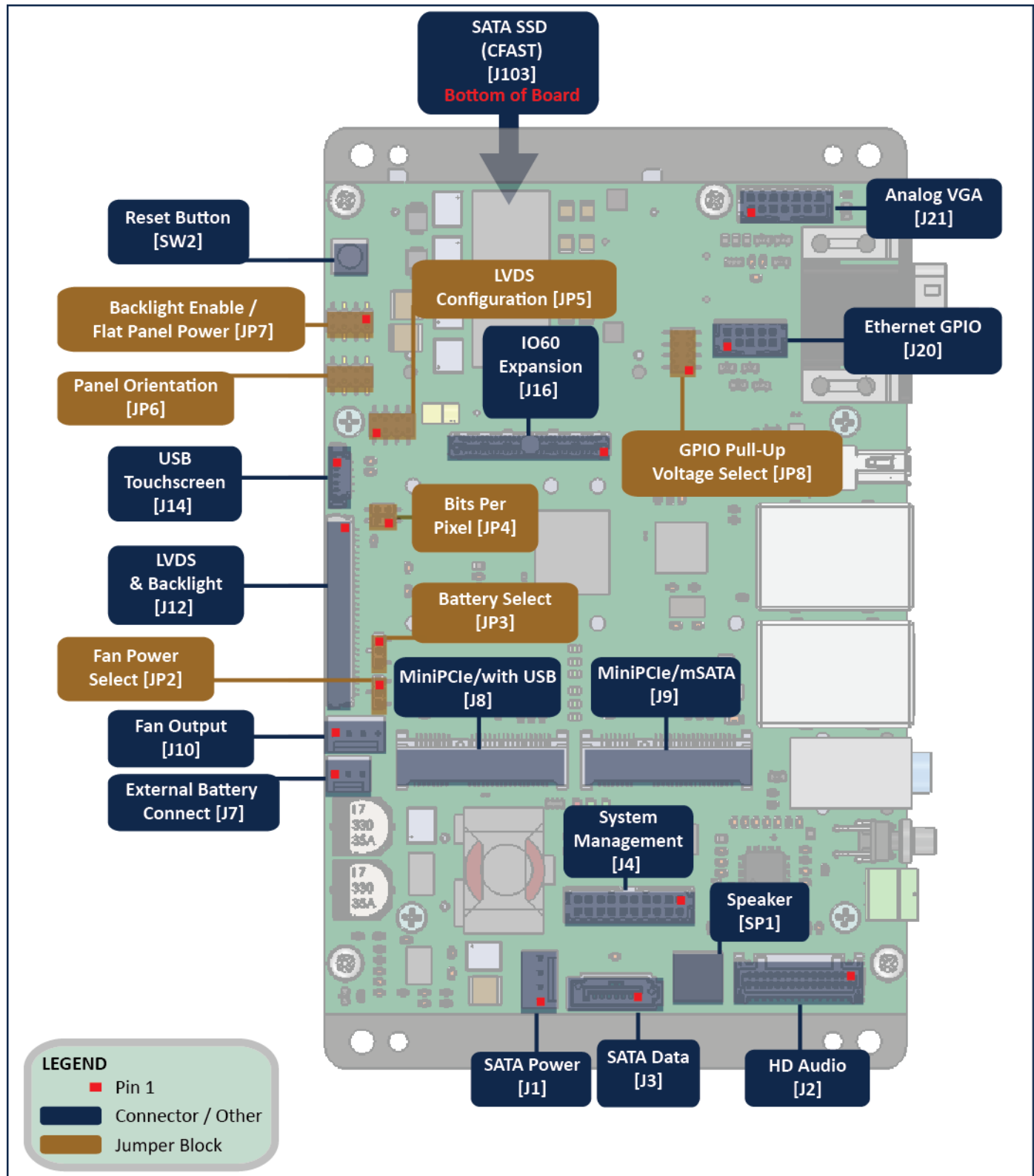


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3.0 Topside Connectors, Jumpers, and Switches

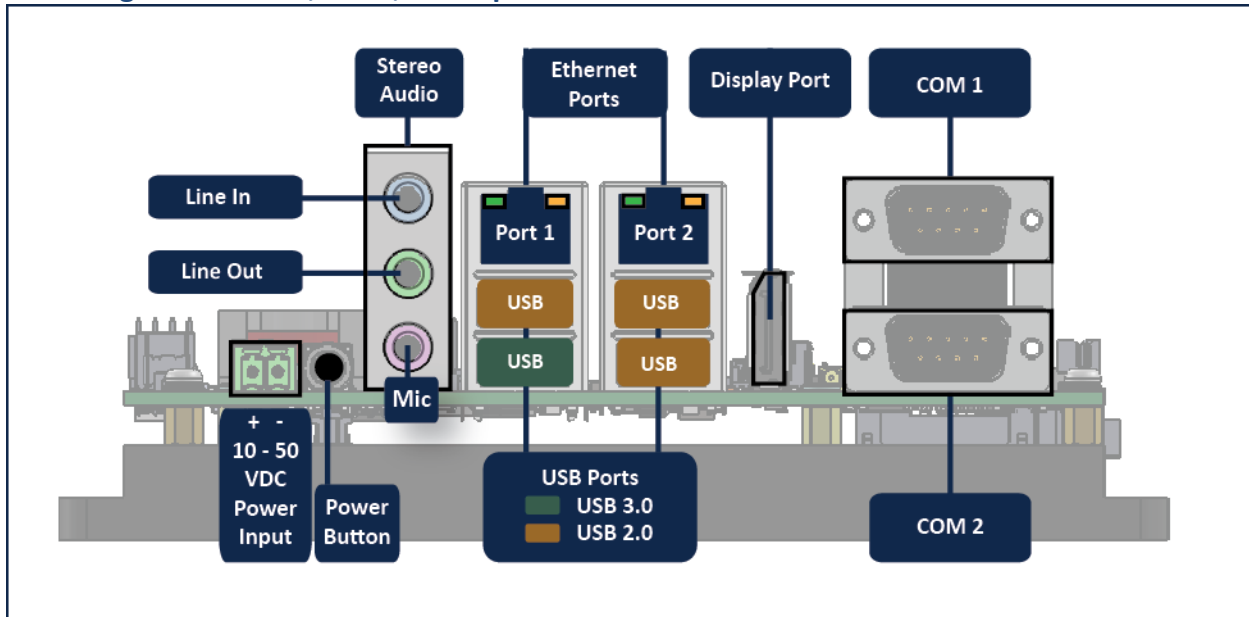


IMPORTANT! This product ships with a heat sink; removing the heat sink VOIDS the warranty.



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3.1 Edge Connectors, Ports, and Inputs


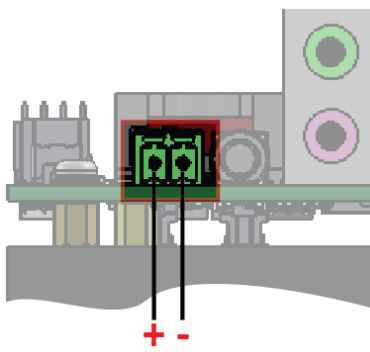



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4.0 Connector, Switch, and Jumper Configurations

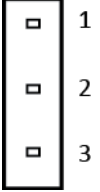
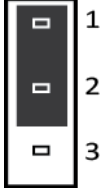
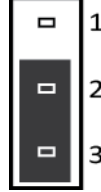

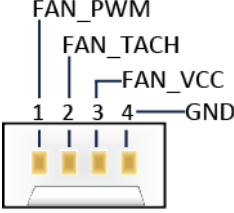
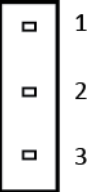
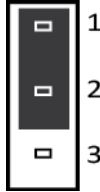
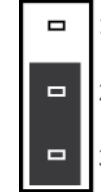
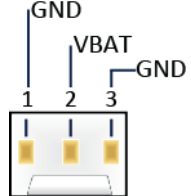
4.1 Power

For locations of Connectors, switches, jumpers, and ports, refer to **Sections 2 and 3** of this User Manual.

POWER		
Name/Function	Layout	Additional Information
Power Button [SW1]		<p>The Power Button (SW1), located on the lower right edge of the board next to the audio line in/line out/microphone input, controls power to the SBC35-CC405. Upon initial hookup of power to J5, the power button is bypassed and the board powers up automatically. However, after initial power up:</p> <ul style="list-style-type: none"> A brief press of SW1 powers the unit on or off, depending on the present state If the unit accidentally locks up and is unresponsive, press and hold SW1 for four (4) seconds to perform a hard restart
+10 - +50 Volt DC Power Input [J5]		<p>The SBC35-CC405 is capable of operating from +10 to +50 VDC (+/-5%). The green power input connector (J5) is located next to the power button on the edge of the board.</p> <hr/> <div>  <p>WARNING! If you reverse the voltage from what is depicted in the image to the left, you will void the warranty and damage the board.</p> </div> <hr/>


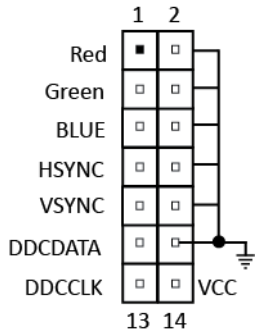
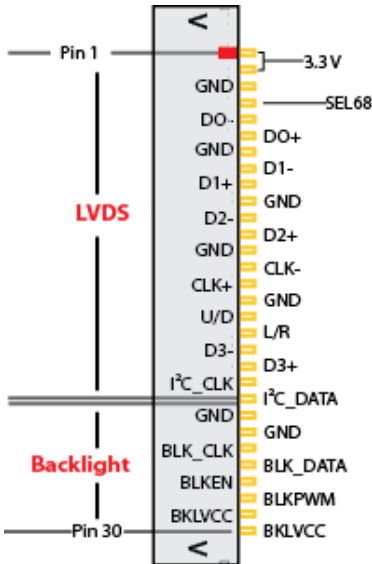
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POWER

Name/Function	Layout			Additional Information
Fan Voltage Output [JP2]	 <p>Default Setting</p>	 <p>For 5VDC @ J10</p>	 <p>For 12V DC @ J10</p>	<p>This jumper setting provides either a +5 or +12 VDC output at pin 3 (FAN_VCC) of connector J10, External Fan Connect. Select the appropriate voltage output based on fan requirements. <u>The default setting is no jumper.</u></p> <hr/> <p> NOTE: A fan is not provided with the unit.</p>
External Fan Connect [J10]				<p>The fan voltage output of this connector is determined by the jumper configuration on JP2.</p>
Battery Select [JP3]	 <p>No battery backup</p>	 <p>External battery backup</p>	 <p>Internal battery backup</p>	<p>To use an external battery (connected at J7), jumper pins 1 & 2 (default setting). For using an internal (optional) battery, jumper pins 2 & 3. The external battery supplies the SBC35-CC405 board with external standby power for the real-time clock, CMOS, and optional GPS.</p>
External Battery Connect [J7]				<p>Supplies the SBC35-CC405 board with external standby power for the real-time clock, CMOS, and optional GPS. An extended temperature lithium battery is available from WinSystems, part # BAT-LTC-E-36-16-1 or BAT-LTC-E-36-27-1. For OEM applications, an on-board battery can be integrated into the motherboard. Please contact a WinSystems' Application Engineer for more information.</p>

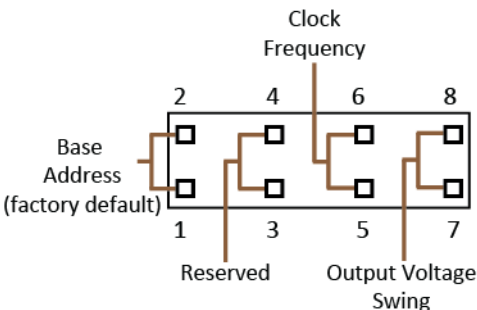
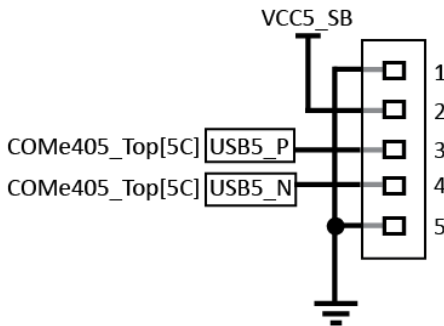
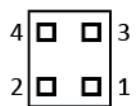
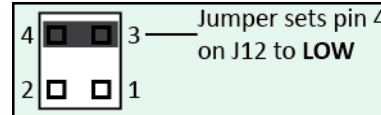
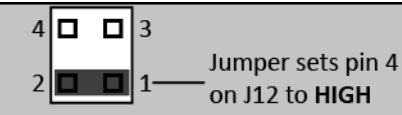

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4.2 Video

VIDEO		
Designation	Layout	Additional Information
Display Port 1.1 [J15]		<p>The Display Port 1.1 connector is located at J15. Aside from video, it also delivers high definition (HD) audio. See the Audio section for more information.</p>
Analog VGA [J21]		<p>SBC35-CC405 supports analog VGA and requires cable (CBL-234-G-1-1.375C) from WinSystems.</p>
LVDS & Backlight [J12]		<p>Flat panel displays connect to the SBC35-CC405 motherboard at J12. The board supports LVDS resolutions up to 1920x1200 at 24 bits per pixel (Bpp). A USB Touchscreen interface connection is located at J14. Panel color mode selection for 6-or 8-bits per pixel is configured at JP4. All resolutions are panel hardware dependent.</p>

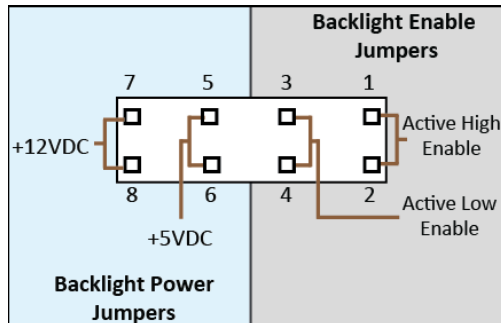

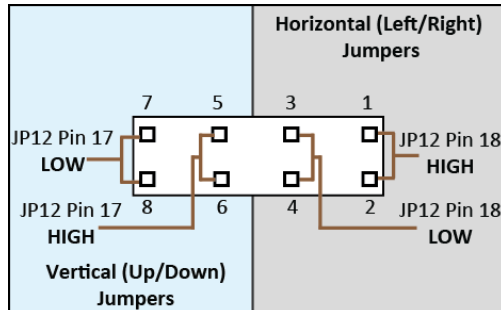

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VIDEO

Designation	Layout	Additional Information																																														
<div>LVDS Configuration</div> <div>[JP5]</div>	<div></div> <div>LVDS Configuration Jumpers</div>	<div>The graphics engine supports two independent interfaces. Configuration for LVDS, LVDS output swing, and clock frequency for I²C is made at JP5 using the selection options depicted in the layout illustration to the left and configuration table to the right.</div>	<table><tr><th>Jumper Type</th><th>Configuration Type</th><th>1-2</th><th>3-4</th><th>5-6</th><th>7-8</th></tr><tr><td rowspan="2">Base Address</td><td>Dual I²C 0xC0</td><td></td><td></td><td></td><td></td></tr><tr><td>Single I²C 0x40*</td><td>*</td><td></td><td></td><td></td></tr><tr><td>Reserved</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td rowspan="2">Clock Frequency</td><td>0.5% Spread</td><td></td><td></td><td></td><td></td></tr><tr><td>0% Spread</td><td></td><td></td><td></td><td></td></tr><tr><td rowspan="2">Output Voltage Swing</td><td>300 mV out</td><td></td><td></td><td></td><td></td></tr><tr><td>400 mV out</td><td></td><td></td><td></td><td></td></tr></table> <div>* Factory default</div> <div><div>Legend</div><div><div></div>No Jumper</div><div><div></div>Jumper</div></div>	Jumper Type	Configuration Type	1-2	3-4	5-6	7-8	Base Address	Dual I ² C 0xC0					Single I ² C 0x40*	*				Reserved						Clock Frequency	0.5% Spread					0% Spread					Output Voltage Swing	300 mV out					400 mV out				
Jumper Type	Configuration Type	1-2	3-4	5-6	7-8																																											
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	0% Spread																																															
Output Voltage Swing	300 mV out																																															
	400 mV out																																															
<div>USB Touchscreen</div> <div>[J14]</div>	<div></div>	<div>J14 (USB 5) provides Plug-and-Play support for a USB Touchscreen. Aside from a simpler and faster interface, it also provides power within the USB cable, eliminating the need for a separate, dedicated cable to power the touchscreen.</div>																																														
<div>Bits Per Pixel</div> <div>[JP4]</div>	<div></div>	<div>Flat Panel Controller. JP4 is panel dependent and controls 6 or 8-bits per pixel where supported.</div> <div><div>Jumper sets pin 4 on J12 to LOW</div><div>Jumper sets pin 4 on J12 to HIGH</div></div> <div><div></div><div>WARNING! Jumpering more than one set of pins on JP4 at a time will damage the board.</div></div>																																														

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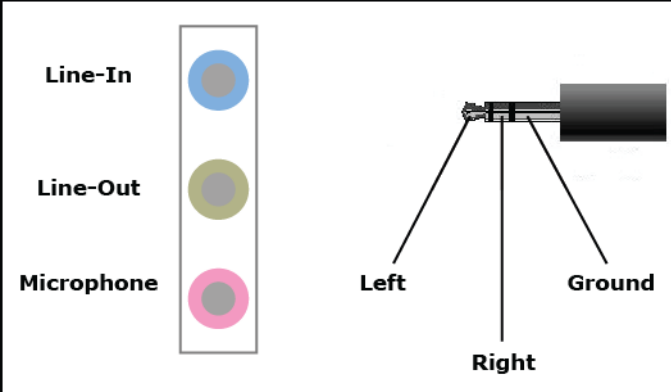
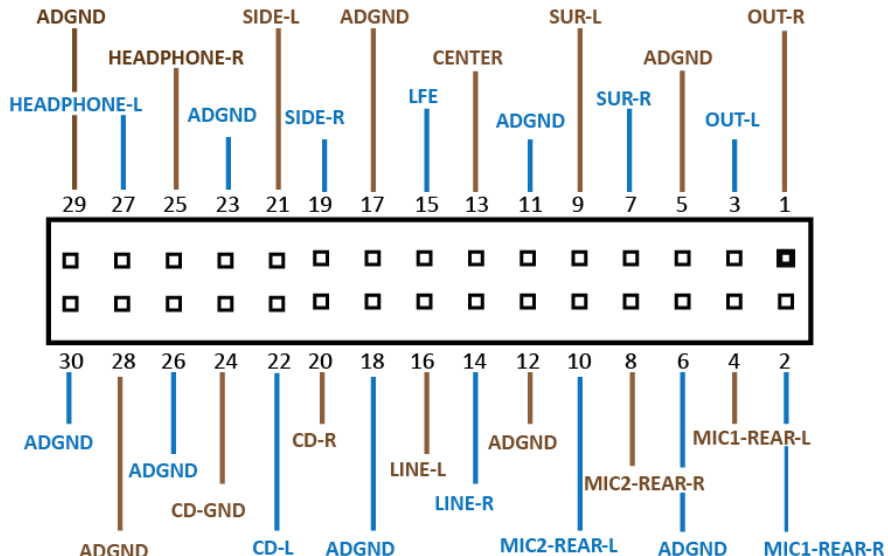
VIDEO

Designation	Layout	Additional Information																																		
Backlight Power [JP7]		Use the layout graphic on the left and/or the configuration table on the right to select the appropriate jumper for backlight power and backlight enable at JP7 .	<table><tr><th rowspan="2">Backlight</th><th rowspan="2">Option</th><th colspan="4">Jumper Pins</th></tr><tr><th>1-2</th><th>3-4</th><th>5-6</th><th>7-8</th></tr><tr><td rowspan="2">Backlight Enable</td><td>Active High Enable</td><td></td><td></td><td></td><td></td></tr><tr><td>Active Low Enable</td><td></td><td></td><td></td><td></td></tr><tr><td rowspan="2">Backlight Power</td><td>+5VDC</td><td></td><td></td><td></td><td></td></tr><tr><td>+12VDC</td><td></td><td></td><td></td><td></td></tr></table>	Backlight	Option	Jumper Pins				1-2	3-4	5-6	7-8	Backlight Enable	Active High Enable					Active Low Enable					Backlight Power	+5VDC					+12VDC					<div><div>Legend</div><div><div>No Jumper</div><div>Jumper</div></div></div> <div><div></div><div>WARNING! JP7 supports one jumper for backlight enable settings and one jumper for backlight power settings (two total). However, jumpering more than one set of pins (for backlight enable) and one set of pins (for backlight power) <u>will</u> damage the board.</div></div>
						Backlight	Option	Jumper Pins																												
1-2	3-4	5-6	7-8																																	
Backlight Enable	Active High Enable																																			
	Active Low Enable																																			
Backlight Power	+5VDC																																			
	+12VDC																																			
Panel Orientation [JP6]		The jumpers on JP6 control up/down and left/right panel orientation. Use the layout graphic on the left and/or panel orientation table on the right to determine the appropriate jumpers. * Not all panels support left/right orientation.	<table><tr><th rowspan="2">Panel Orientation</th><th rowspan="2">Option</th><th colspan="4">Jumper Pins</th></tr><tr><th>1-2</th><th>3-4</th><th>5-6</th><th>7-8</th></tr><tr><td rowspan="2">Horizontal (Left/Right)</td><td>J12 Pin 18 - High</td><td></td><td></td><td></td><td></td></tr><tr><td>J12 Pin 18 - Low</td><td></td><td></td><td></td><td></td></tr><tr><td rowspan="2">Vertical (Up/Down)</td><td>J12 Pin 17 - High</td><td></td><td></td><td></td><td></td></tr><tr><td>J12 Pin 17 - Low</td><td></td><td></td><td></td><td></td></tr></table>	Panel Orientation	Option	Jumper Pins				1-2	3-4	5-6	7-8	Horizontal (Left/Right)	J12 Pin 18 - High					J12 Pin 18 - Low					Vertical (Up/Down)	J12 Pin 17 - High					J12 Pin 17 - Low					<div><div>Legend</div><div><div>No Jumper</div><div>Jumper</div></div></div> <div><div></div><div>WARNING! JP6 supports one jumper for horizontal panel orientation and one jumper for vertical panel orientation (two total). However, jumpering more than one set of pins (for vertical) and one set of pins (for horizontal) <u>will</u> damage the board.</div></div>
						Panel Orientation	Option	Jumper Pins																												
1-2	3-4	5-6	7-8																																	
Horizontal (Left/Right)	J12 Pin 18 - High																																			
	J12 Pin 18 - Low																																			
Vertical (Up/Down)	J12 Pin 17 - High																																			
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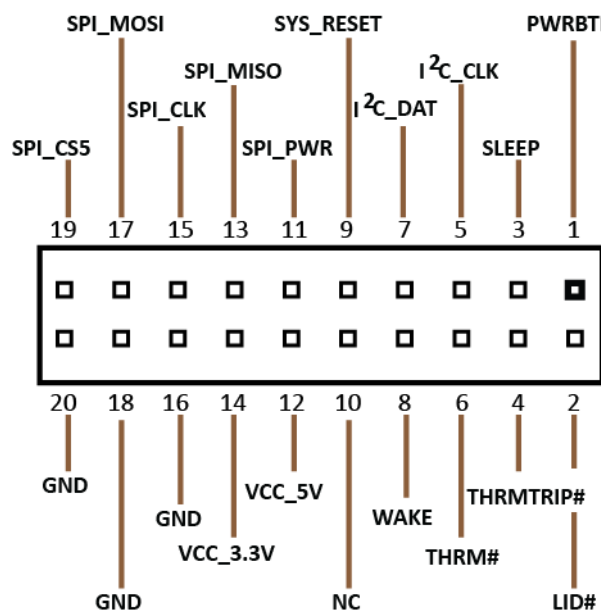
4.3 Audio

The SBC35-CC405 Intel Atom E3800 family processor uses the Realtek ALC888S-VD codec controller which provides both Digital and Analog channels. The controller has three jack detection pins and a built-in beep generator. The SBC35-CC405 supports three audio interfaces - one digital (Display Port 1.1), two analog (Stereo Audio [Line-In/Line-Out/Microphone], and one HD Audio (7.1 Surround). The Display Port 1.1 interface located at **J15** also delivers video capability; see more information about this interface in the [Video](#) section of this user manual.

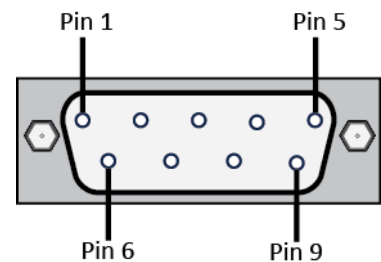
AUDIO		
Designation	Layout	Additional Information
Stereo Audio (Line-In, Line-Out, & Mic) [J6]		<p>The SBC35-CC405 uses 3.5-mm stereo line-out, line-in, and microphone jacks at J6. The diagram to the left depicts the line-in, line-out, and microphone ports.</p>
HD Audio 7.1 Surround [J2]		<p>HD Audio connection. WinSystems cable CBL-AUDIO7-102-12, delivers 7.1 (surround sound) audio from this connector. CBL-AUDIO5-102-12 delivers 5.1 audio, and CBL-AUDIO3-102-12 delivers stereo audio.</p>

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4.4 System Management

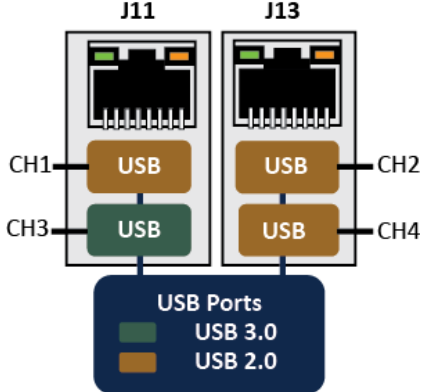
SYSTEM MANAGEMENT																	
Designation	Layout	Additional Information															
System Management [J4]		<p>J4 supports many system features. The primary uses are to provide a security feature to manage system intrusion and provide notification on thermal status. Pin 2 (LID#) signifies whether the system is on/off or opened/closed and can be used for an intruder alert. If this particular bit is set, the user can wire it to their system to initiate a system shut down. Pin 4 provides thermal trip status, action (e.g., system shut down) is taken in response to the system overheating, and the user can be notified of a thermal trip. More information regarding thermal protection signaling is provided in the table below. Additionally, you can also tie J4 to a sleep mode via Pin 3.</p>															
	<table><tr><th colspan="4">Thermal Protection Signaling</th></tr><tr><th>Thermal Protection</th><th>Pin</th><th>Power Rail</th><th>Description</th></tr><tr><td>THRM#</td><td>1</td><td>3.3V/3.3V</td><td>Input from off-Module temp sensor indicating an over-temp situation</td></tr><tr><td>THRMTRIP#</td><td>0</td><td>3.3V/3.3V</td><td>Active low output indicating that the CPU has entered thermal</td></tr></table>		Thermal Protection Signaling				Thermal Protection	Pin	Power Rail	Description	THRM#	1	3.3V/3.3V	Input from off-Module temp sensor indicating an over-temp situation	THRMTRIP#	0	3.3V/3.3V
Thermal Protection Signaling																	
Thermal Protection	Pin	Power Rail	Description														
THRM#	1	3.3V/3.3V	Input from off-Module temp sensor indicating an over-temp situation														
THRMTRIP#	0	3.3V/3.3V	Active low output indicating that the CPU has entered thermal														

4.5 Serial

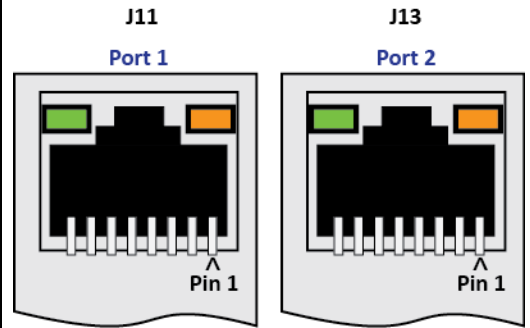
SERIAL																																											
Designation	Layout	Additional Information																																									
<div>COM 1</div> <div>[J19A]</div> <div>COM 2</div> <div>[J19B]</div>		<p>The SBC35-CC405 is equipped with two on-board serial ports (RS-232/422/485) at J19. Both serial channels use the advanced EXAR SP339E multiprotocol transceiver. Both ports are configured in the BIOS and include options for 120-ohm receiver termination, slew rate, and protocol.</p>	<table><tr><th>Pin</th><th>RS-232</th><th>RS-422</th><th>RS-485</th></tr><tr><td>1</td><td>DCD</td><td>N/A</td><td>N/A</td></tr><tr><td>2</td><td>RX</td><td>TX+</td><td>TX/RX+</td></tr><tr><td>3</td><td>TX</td><td>RX+</td><td>N/A</td></tr><tr><td>4</td><td>DTR</td><td>N/A</td><td>N/A</td></tr><tr><td>5</td><td>GND</td><td>GND</td><td>GND</td></tr><tr><td>6</td><td>DSR</td><td>TX-</td><td>TX/RX-</td></tr><tr><td>7</td><td>RTS</td><td>RX-</td><td>N/A</td></tr><tr><td>8</td><td>CTR</td><td>N/A</td><td>N/A</td></tr><tr><td>9</td><td>RI</td><td>N/A</td><td>N/A</td></tr></table>	Pin	RS-232	RS-422	RS-485	1	DCD	N/A	N/A	2	RX	TX+	TX/RX+	3	TX	RX+	N/A	4	DTR	N/A	N/A	5	GND	GND	GND	6	DSR	TX-	TX/RX-	7	RTS	RX-	N/A	8	CTR	N/A	N/A	9	RI	N/A	N/A
Pin	RS-232	RS-422	RS-485																																								
1	DCD	N/A	N/A																																								
2	RX	TX+	TX/RX+																																								
3	TX	RX+	N/A																																								
4	DTR	N/A	N/A																																								
5	GND	GND	GND																																								
6	DSR	TX-	TX/RX-																																								
7	RTS	RX-	N/A																																								
8	CTR	N/A	N/A																																								
9	RI	N/A	N/A																																								

SBC35-CC405 User Manual

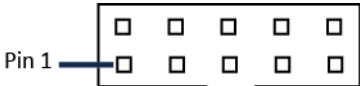
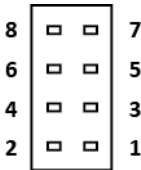

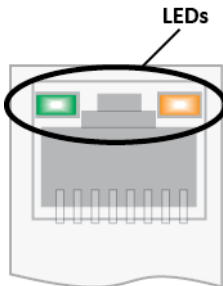
4.6 USB

USB																													
Designation	Layout	Additional Information																											
<div>USB 2.0 / 3.0 (Channels 1 & 3)</div> <div>[J11]</div> <div>USB 2.0 (Channels 2 & 4)</div> <div>[J13]</div>		<div>J11 provides USB 3.0 on the bottom port (CH3) and USB 2.0 on the top port (CH1). J13 provide USB 2.0 on both ports (CH2 & CH4).</div>	<table><tr><th>Pin</th><th>USB 3.0</th><th>USB 2.0</th></tr><tr><td>1</td><td colspan="2">USBVCC</td></tr><tr><td>2</td><td colspan="2">D-</td></tr><tr><td>3</td><td colspan="2">D+</td></tr><tr><td>4</td><td colspan="2">GND</td></tr><tr><td>5</td><td>RX-</td><td rowspan="5">Not Present</td></tr><tr><td>6</td><td>RX+</td></tr><tr><td>7</td><td>GND</td></tr><tr><td>8</td><td>TX-</td></tr><tr><td>9</td><td>TX+</td></tr></table>	Pin	USB 3.0	USB 2.0	1	USBVCC		2	D-		3	D+		4	GND		5	RX-	Not Present	6	RX+	7	GND	8	TX-	9	TX+
Pin	USB 3.0	USB 2.0																											
1	USBVCC																												
2	D-																												
3	D+																												
4	GND																												
5	RX-	Not Present																											
6	RX+																												
7	GND																												
8	TX-																												
9	TX+																												

4.7 Ethernet

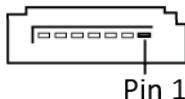

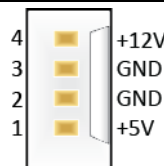
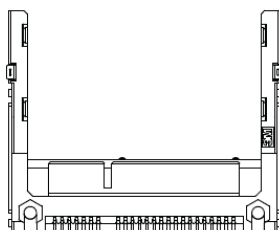
ETHERNET																																							
Designation	Layout	Additional Information																																					
Ethernet [J11, J13]		<p>Two Intel I210 Gigabit Ethernet controllers provide standard IEEE 1588 and 802.1AS protocol time-stamping. Each Ethernet interface includes 10/100/1000 MP/s multi-speed, full, and half-duplex operation.</p>	<table border="1"> <thead> <tr> <th>Pin</th><th>Function</th><th>Description</th><th>Cable Color</th></tr> </thead> <tbody> <tr> <td>1</td><td>TX_D1+</td><td>Tranceive Data+</td><td> white/green</td></tr> <tr> <td>2</td><td>TX_D1-</td><td>Tranceive Data-</td><td> green</td></tr> <tr> <td>3</td><td>RX_D2+</td><td>Receive Data+</td><td> white/orange</td></tr> <tr> <td>4</td><td>BI_D3+</td><td>Bi-directional Data+</td><td> blue</td></tr> <tr> <td>5</td><td>BI_D3-</td><td>Bi-directional Data-</td><td> white/blue</td></tr> <tr> <td>6</td><td>RX_D2-</td><td>Receive Data-</td><td> orange</td></tr> <tr> <td>7</td><td>BI_D4+</td><td>Bi-directional Data+</td><td> white/brown</td></tr> <tr> <td>8</td><td>BI_D4-</td><td>Bi-directional Data-</td><td> brown</td></tr> </tbody> </table>	Pin	Function	Description	Cable Color	1	TX_D1+	Tranceive Data+	white/green	2	TX_D1-	Tranceive Data-	green	3	RX_D2+	Receive Data+	white/orange	4	BI_D3+	Bi-directional Data+	blue	5	BI_D3-	Bi-directional Data-	white/blue	6	RX_D2-	Receive Data-	orange	7	BI_D4+	Bi-directional Data+	white/brown	8	BI_D4-	Bi-directional Data-	brown
Pin	Function	Description	Cable Color																																				
1	TX_D1+	Tranceive Data+	white/green																																				
2	TX_D1-	Tranceive Data-	green																																				
3	RX_D2+	Receive Data+	white/orange																																				
4	BI_D3+	Bi-directional Data+	blue																																				
5	BI_D3-	Bi-directional Data-	white/blue																																				
6	RX_D2-	Receive Data-	orange																																				
7	BI_D4+	Bi-directional Data+	white/brown																																				
8	BI_D4-	Bi-directional Data-	brown																																				

ETHERNET

Designation	Layout	Additional Information																							
<div>Ethernet (GPIO) Controller</div> <div>[J20]</div>		<p>The SBC35-CC405 is equipped with an Ethernet GPIO connector at J20, which is associated with Ethernet port 2 at J13. Reference power to J20 is controlled by jumper settings on JP8 (below).</p>	<table><tr><th>Pin</th><th>Function</th></tr><tr><td>1</td><td>GPIO0</td></tr><tr><td>2</td><td>GND</td></tr><tr><td>3</td><td>GPIO1</td></tr><tr><td>4</td><td>GND</td></tr><tr><td>5</td><td>GPIO2</td></tr><tr><td>6</td><td>GND</td></tr><tr><td>7</td><td>GPIO3</td></tr><tr><td>8</td><td>GND</td></tr><tr><td>9</td><td>VDD IO</td></tr><tr><td>10</td><td>GND</td></tr></table>	Pin	Function	1	GPIO0	2	GND	3	GPIO1	4	GND	5	GPIO2	6	GND	7	GPIO3	8	GND	9	VDD IO	10	GND
Pin	Function																								
1	GPIO0																								
2	GND																								
3	GPIO1																								
4	GND																								
5	GPIO2																								
6	GND																								
7	GPIO3																								
8	GND																								
9	VDD IO																								
10	GND																								
<div>Ethernet GPIO Reference Voltage Selection</div> <div>[JP8]</div>		<p>The table to the right provides jumpers for voltage settings on JP8. The board supports voltages of 3.3V, 5V, and 12V.</p>	<table><tr><th>Voltage</th><th>Jumper Pins</th></tr><tr><td>3.3V</td><td>1 - 2</td></tr><tr><td>5.0V</td><td>3 - 4</td></tr><tr><td>12.0V</td><td>5 - 6</td></tr></table> <div> WARNING! Jumpering more than one set of pins at a time will damage the board.</div>	Voltage	Jumper Pins	3.3V	1 - 2	5.0V	3 - 4	12.0V	5 - 6														
Voltage	Jumper Pins																								
3.3V	1 - 2																								
5.0V	3 - 4																								
12.0V	5 - 6																								
<div>Ethernet LEDs</div>		<p>On-board Ethernet activity LEDs are built into the connectors at J11 & J13. There is one green LED (left) and one bi-color green/yellow LED (right). Activity signals for these lights are defined in the table to the right.</p>	<table><tr><th>LED</th><th>Activity</th><th>Ethernet Status</th></tr><tr><td rowspan="2">Left</td><td>Off</td><td>No Link</td></tr><tr><td>Flashing</td><td>Linked</td></tr><tr><td rowspan="4">Right</td><td>Off</td><td>No Link</td></tr><tr><td>On</td><td>Linked @ 10 MB</td></tr><tr><td>On</td><td>Linked @ 100 MB</td></tr><tr><td>On</td><td>Linked @ 1 GB</td></tr></table>	LED	Activity	Ethernet Status	Left	Off	No Link	Flashing	Linked	Right	Off	No Link	On	Linked @ 10 MB	On	Linked @ 100 MB	On	Linked @ 1 GB					
LED	Activity	Ethernet Status																							
Left	Off	No Link																							
	Flashing	Linked																							
Right	Off	No Link																							
	On	Linked @ 10 MB																							
	On	Linked @ 100 MB																							
	On	Linked @ 1 GB																							

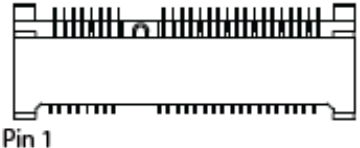
SBC35-CC405 User Manual

4.8 Serial ATA (SATA)

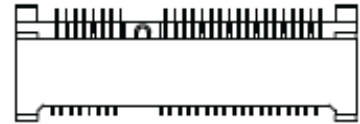

SERIAL ATA (SATA)																																																																																					
Designation	Layout	Additional Information																																																																																			
Serial ATA [J3]		The bootable SATA (2.0) interface is located at J3. WinSystems offers CBL-SATA-701-20 for this connector.		<table><tr><th>Pin</th><th>Function</th></tr><tr><td>1</td><td>GND</td></tr><tr><td>2</td><td>RX1+</td></tr><tr><td>3</td><td>RX1-</td></tr><tr><td>4</td><td>GND</td></tr><tr><td>5</td><td>TX1-</td></tr><tr><td>6</td><td>TX1+</td></tr><tr><td>7</td><td>GND</td></tr></table>		Pin	Function	1	GND	2	RX1+	3	RX1-	4	GND	5	TX1-	6	TX1+	7	GND																																																																
		Pin	Function																																																																																		
		1	GND																																																																																		
2	RX1+																																																																																				
3	RX1-																																																																																				
4	GND																																																																																				
5	TX1-																																																																																				
6	TX1+																																																																																				
7	GND																																																																																				
 NOTE: J3 cannot be used when J9 mSATA is present.																																																																																					
SATA Power [J1]		Power is supplied to the SATA device via the connector at J1. WinSystems offers CBL-PWR-117-12 for this connector.																																																																																			
CFAST (SATA SSD) [J103] On back of the board		The SBC35-CC405 supports CFAST storage at J103 located on the back of the board . CFAST is a small form factor SATA SSD. Pin definitions are provided in the table to the right.	<table><tr><th>Pin</th><th>CFAST</th><th>Description</th><th>Pin</th><th>CFAST</th><th>Description</th></tr><tr><td>S1</td><td>SGND</td><td>Signal Ground</td><td>PC5</td><td>NC</td><td>No Connect</td></tr><tr><td>S2</td><td>A+</td><td rowspan="2">SATA PAIR A</td><td>PC6</td><td>NC</td><td>No Connect</td></tr><tr><td>S3</td><td>A-</td><td>PC7</td><td>GND</td><td>Ground</td></tr><tr><td>S4</td><td>SGND</td><td>Digital GND</td><td>PC8</td><td>LED1</td><td>LED Output</td></tr><tr><td>S5</td><td>B-</td><td rowspan="2">SATA PAIR B</td><td>PC9</td><td>LED2</td><td>LED Output</td></tr><tr><td>S6</td><td>B+</td><td>PC10</td><td>IO1</td><td>Reserved</td></tr><tr><td>S7</td><td>SGND</td><td>Signal Ground</td><td>PC11</td><td>IO2</td><td>Reserved</td></tr><tr><td>Key</td><td></td><td></td><td>PC12</td><td>IO3</td><td>Reserved</td></tr><tr><td>Key</td><td></td><td></td><td>PC13</td><td>3.3V</td><td>Power</td></tr><tr><td>PC1</td><td>CDI</td><td>Card Detect In</td><td>PC14</td><td>3.3V</td><td>Power</td></tr><tr><td>PC2</td><td>GND</td><td>Ground</td><td>PC15</td><td>GND</td><td>Ground</td></tr><tr><td>PC3</td><td>NC</td><td>No Connect</td><td>PC16</td><td>GND</td><td>Ground</td></tr><tr><td>PC4</td><td>NC</td><td>No Connect</td><td>PC17</td><td>GND</td><td>Card Detect Out</td></tr></table>	Pin	CFAST	Description	Pin	CFAST	Description	S1	SGND	Signal Ground	PC5	NC	No Connect	S2	A+	SATA PAIR A	PC6	NC	No Connect	S3	A-	PC7	GND	Ground	S4	SGND	Digital GND	PC8	LED1	LED Output	S5	B-	SATA PAIR B	PC9	LED2	LED Output	S6	B+	PC10	IO1	Reserved	S7	SGND	Signal Ground	PC11	IO2	Reserved	Key			PC12	IO3	Reserved	Key			PC13	3.3V	Power	PC1	CDI	Card Detect In	PC14	3.3V	Power	PC2	GND	Ground	PC15	GND	Ground	PC3	NC	No Connect	PC16	GND	Ground	PC4	NC	No Connect	PC17	GND	Card Detect Out
			Pin	CFAST	Description	Pin	CFAST	Description																																																																													
S1	SGND	Signal Ground	PC5	NC	No Connect																																																																																
S2	A+	SATA PAIR A	PC6	NC	No Connect																																																																																
S3	A-		PC7	GND	Ground																																																																																
S4	SGND	Digital GND	PC8	LED1	LED Output																																																																																
S5	B-	SATA PAIR B	PC9	LED2	LED Output																																																																																
S6	B+		PC10	IO1	Reserved																																																																																
S7	SGND	Signal Ground	PC11	IO2	Reserved																																																																																
Key			PC12	IO3	Reserved																																																																																
Key			PC13	3.3V	Power																																																																																
PC1	CDI	Card Detect In	PC14	3.3V	Power																																																																																
PC2	GND	Ground	PC15	GND	Ground																																																																																
PC3	NC	No Connect	PC16	GND	Ground																																																																																
PC4	NC	No Connect	PC17	GND	Card Detect Out																																																																																

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4.9 MINIPCIe

MINIPCIe (J8, J9)																																																																																																																			
Designation	Layout	Additional Information																																																																																																																	
MiniPCIe [J8]	 <p>Pin 1</p>	<p>The SBC35-CC405 includes a MiniPCIe socket at J8. Pin definitions are provided in the table to the right.</p>																																																																																																																	
		<p style="text-align: center;">J8</p> <table border="1"> <thead> <tr> <th>Pin</th><th>Name</th><th>Pin</th><th>Name</th></tr> </thead> <tbody> <tr><td>1</td><td>WAKE#</td><td>2</td><td>3.3Vaux</td></tr> <tr><td>3</td><td>NC</td><td>4</td><td>GND</td></tr> <tr><td>5</td><td>NC</td><td>6</td><td>1.5V</td></tr> <tr><td>7</td><td>CLKREQ#</td><td>8</td><td>NC</td></tr> <tr><td>9</td><td>GND</td><td>10</td><td>NC</td></tr> <tr><td>11</td><td>REFCLK-</td><td>12</td><td>NC</td></tr> <tr><td>13</td><td>REFCLK+</td><td>14</td><td>NC</td></tr> <tr><td>15</td><td>GND</td><td>16</td><td>NC</td></tr> <tr><td colspan="4">Mechanical Key</td></tr> <tr><td>17</td><td>NC</td><td>18</td><td>GND</td></tr> <tr><td>19</td><td>NC</td><td>20</td><td>W_DISABLE#</td></tr> <tr><td>21</td><td>GND</td><td>22</td><td>PERST#</td></tr> <tr><td>23</td><td>PERn0</td><td>24</td><td>+3.3Vaux</td></tr> <tr><td>25</td><td>PERp0</td><td>26</td><td>GND</td></tr> <tr><td>27</td><td>GND</td><td>28</td><td>+1.5V</td></tr> <tr><td>29</td><td>GND</td><td>30</td><td>SMB_CLK</td></tr> <tr><td>31</td><td>PETn0</td><td>32</td><td>SMB_DATA</td></tr> <tr><td>33</td><td>PETp0</td><td>34</td><td>GND</td></tr> <tr><td>35</td><td>GND</td><td>36</td><td>USB_D-</td></tr> <tr><td>37</td><td>GND</td><td>38</td><td>USB_D+</td></tr> <tr><td>39</td><td>+3.3Vaux</td><td>40</td><td>GND</td></tr> <tr><td>41</td><td>+3.3Vaux</td><td>42</td><td>LED_WWAN#</td></tr> <tr><td>43</td><td>GND</td><td>44</td><td>LED_WLAN#</td></tr> <tr><td>45</td><td>NC</td><td>46</td><td>LED_WPAN#</td></tr> <tr><td>47</td><td>NC</td><td>48</td><td>+1.5V</td></tr> <tr><td>49</td><td>NC</td><td>50</td><td>GND</td></tr> <tr><td>51</td><td>NC</td><td>52</td><td>+3.3Vaux</td></tr> </tbody> </table> <p>NC - Not Connected</p>		Pin	Name	Pin	Name	1	WAKE#	2	3.3Vaux	3	NC	4	GND	5	NC	6	1.5V	7	CLKREQ#	8	NC	9	GND	10	NC	11	REFCLK-	12	NC	13	REFCLK+	14	NC	15	GND	16	NC	Mechanical Key				17	NC	18	GND	19	NC	20	W_DISABLE#	21	GND	22	PERST#	23	PERn0	24	+3.3Vaux	25	PERp0	26	GND	27	GND	28	+1.5V	29	GND	30	SMB_CLK	31	PETn0	32	SMB_DATA	33	PETp0	34	GND	35	GND	36	USB_D-	37	GND	38	USB_D+	39	+3.3Vaux	40	GND	41	+3.3Vaux	42	LED_WWAN#	43	GND	44	LED_WLAN#	45	NC	46	LED_WPAN#	47	NC	48	+1.5V	49	NC	50	GND	51	NC	52	+3.3Vaux
Pin	Name	Pin	Name																																																																																																																
1	WAKE#	2	3.3Vaux																																																																																																																
3	NC	4	GND																																																																																																																
5	NC	6	1.5V																																																																																																																
7	CLKREQ#	8	NC																																																																																																																
9	GND	10	NC																																																																																																																
11	REFCLK-	12	NC																																																																																																																
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29	GND	30	SMB_CLK																																																																																																																
31	PETn0	32	SMB_DATA																																																																																																																
33	PETp0	34	GND																																																																																																																
35	GND	36	USB_D-																																																																																																																
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39	+3.3Vaux	40	GND																																																																																																																
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MINIPCIe (J8, J9)

Designation	Layout	Additional Information																																																																																																																			
MiniPCle with mSATA Support [J9]	 Pin 1	<p>The SBC35-CC405 includes a MiniPCle socket at J9. The socket auto detects mSATA, providing a bootable media and storage interface. Pin definitions are provided in the table to the right.</p>																																																																																																																			
		<div> NOTE: J9 cannot be used when J3 SATA is present.</div>																																																																																																																			
		<div><p style="text-align: center;">J9</p><table><tr><th>Pin</th><th>Name</th><th>Pin</th><th>Name</th></tr><tr><td>1</td><td>WAKE#</td><td>2</td><td>3.3Vaux</td></tr><tr><td>3</td><td>NC</td><td>4</td><td>GND</td></tr><tr><td>5</td><td>NC</td><td>6</td><td>1.5V</td></tr><tr><td>7</td><td>CLKREQ#</td><td>8</td><td>NC</td></tr><tr><td>9</td><td>GND</td><td>10</td><td>NC</td></tr><tr><td>11</td><td>REFCLK-</td><td>12</td><td>NC</td></tr><tr><td>13</td><td>REFCLK+</td><td>14</td><td>NC</td></tr><tr><td>15</td><td>GND</td><td>16</td><td>NC</td></tr><tr><td colspan="4">Mechanical Key</td></tr><tr><td>17</td><td>NC</td><td>18</td><td>GND</td></tr><tr><td>19</td><td>NC</td><td>20</td><td>W_DISABLE#</td></tr><tr><td>21</td><td>GND</td><td>22</td><td>PERST#</td></tr><tr><td>23</td><td>PERn0</td><td>24</td><td>+3.3Vaux</td></tr><tr><td>25</td><td>PERp0</td><td>26</td><td>GND</td></tr><tr><td>27</td><td>GND</td><td>28</td><td>+1.5V</td></tr><tr><td>29</td><td>GND</td><td>30</td><td>SMB_CLK</td></tr><tr><td>31</td><td>PETn0</td><td>32</td><td>SMB_DATA</td></tr><tr><td>33</td><td>PETp0</td><td>34</td><td>GND</td></tr><tr><td>35</td><td>GND</td><td>36</td><td>NC</td></tr><tr><td>37</td><td>GND</td><td>38</td><td>NC</td></tr><tr><td>39</td><td>+3.3Vaux</td><td>40</td><td>GND</td></tr><tr><td>41</td><td>+3.3Vaux</td><td>42</td><td>LED_WWAN#</td></tr><tr><td>43</td><td>GND</td><td>44</td><td>LED_WLAN#</td></tr><tr><td>45</td><td>NC</td><td>46</td><td>LED_WPAN#</td></tr><tr><td>47</td><td>NC</td><td>48</td><td>+1.5V</td></tr><tr><td>49</td><td>NC</td><td>50</td><td>GND</td></tr><tr><td>51</td><td>mSATA_DET</td><td>52</td><td>+3.3Vaux</td></tr></table></div> <p>NC - Not Connected</p>				Pin	Name	Pin	Name	1	WAKE#	2	3.3Vaux	3	NC	4	GND	5	NC	6	1.5V	7	CLKREQ#	8	NC	9	GND	10	NC	11	REFCLK-	12	NC	13	REFCLK+	14	NC	15	GND	16	NC	Mechanical Key				17	NC	18	GND	19	NC	20	W_DISABLE#	21	GND	22	PERST#	23	PERn0	24	+3.3Vaux	25	PERp0	26	GND	27	GND	28	+1.5V	29	GND	30	SMB_CLK	31	PETn0	32	SMB_DATA	33	PETp0	34	GND	35	GND	36	NC	37	GND	38	NC	39	+3.3Vaux	40	GND	41	+3.3Vaux	42	LED_WWAN#	43	GND	44	LED_WLAN#	45	NC	46	LED_WPAN#	47	NC	48	+1.5V	49	NC	50	GND	51	mSATA_DET	52	+3.3Vaux
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4.10 IO60 Expansion Bus

IO60 Expansion Bus (J16)																																																																																																																												
Designation	Layout	Additional Information																																																																																																																										
IO60 Expansion Bus [J16]		The expansion bus allows mezzanine cards to provide additional functionality	J16																																																																																																																									
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Pin	Name	Pin	Name																																																																																																																									
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5.0 Setup

Use the Figures provided in **Sections 2 and 3** to help locate and identify the connectors outlined in the following steps.

5.1 Installation/Hookup

1. Connect a compatible monitor to the VGA output at **J21**, the Display port at **J15**, or the LVDS and Backlight connector at **J12**, depending on your preference and capabilities (see note above).



NOTE: Depending upon your display method or preferences (flat panel LCD or standard VGA, etc), make sure the jumper for Backlight Power at **JP7** is installed as required. See **JP7** on **page 9** for specific requirements.



NOTE: If using a flat panel LCD display (connector **J12**), configure the panel orientation, LVDS configuration, and bits per pixel to your preferences/requirements. See **JP6** on **page 9** for specific requirements on panel orientation, **JP5** on **page 8** for LVDS configuration, and **JP4** on **page 8** bits per pixel setup.

2. Connect a USB keyboard to any one of the four USB ports at **J11** or **J13**.
3. Plug in the boot media of your preference. The options are:
 - CFAST (**J103** – on back of the board)
 - MSATA (**J9**)
 - External SATA (**J3**)
 - USB (**J11** or **J13**)
 - Ethernet (LAN boot – requires special CMOS settings)
4. Set the jumper at **JP3** (Battery Select) for the type of battery backup to be used (optional).
 - No battery backup [no jumper]
 - External battery backup (Default) [jumper pins 1 & 2]
 - Optional internal battery backup [jumper pins 2 & 3]
5. If using an external battery backup, connect the battery to **J7**.
6. Connect an Ethernet cable to either of the ports at **J11** or **J13**.

5.2 Power Up

1. Plug in a compatible +10 – +50 VDC power source at **J5**. The SBC35-CC405 should boot when power is applied.

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6.0 BIOS Settings

6.1 Boot Up and the Main Menu

Press **F2** at power up to bring up System Utilities in the BIOS. The BIOS Setup screen appears in the display with the **Main** menu highlighted.

Phoenix Secure Technology Setup	
Main	Advanced Others Security Boot Exit
<div>System Date [05/05/2014]</div> <div>System Time [01:09:48]</div> <div>▶ System Information</div> <div>▶ Boot Features</div>	<div>Item Specific Help</div> <div>View or set System date.</div>
<div> <div>F1 Help</div> <div>Esc Exit</div> <div>↑↓ Select Item</div> <div>→ Select Menu</div> <div>+/- Change Values</div> <div>Enter Select ▶ Sub-Menu</div> <div>F9 Setup Defaults</div> <div>F10 Save and Exit</div> </div>	

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6.1.1 Main Menu Items and Submenus

The **Main** menu contains the following items and/or submenus.

MAIN MENU ITEMS & SUBMENUS		
Item / Submenu	Default Setting / Value	Function / Definition
System Date	N/A	Displays the current date in MM/DD/YYYY format. To set or change the date, highlight the row using the up/down arrow keys, then highlight the month, day, or year by pressing the Enter key until the desired value is highlighted with a square block (■). Use the +/- keys to change the highlighted value.
System Time	N/A	Displays the current time in HH/MM/SS format. To set or change the time, highlight the row using the up/down arrow keys, then highlight the hour, minute, or second by pressing the Enter key until the desired value is highlighted with a square block (■). Use the +/- keys to change the highlighted value.
System Information (Read Only) – The following are for example only.		
Item / Submenu	Default Setting / Value	Function / Definition
BIOS Version	CC405yymmdd	BIOS Version
BIOS Build Date	mm/dd/yyyy	BIOS Build Date
EC Version	yymmddTXX	EC Version
EC Build Date	mm/dd/yyyy	EC Build Date
Processor Type	Intel ^(R) Atom™ CPU E3800 series	Processor Type
System Memory Speed	1066 MHz or 1333 MHz	System Memory Speed
L2 Cache RAM	512 KB per Core	L2 Cache RAM
Total Memory	Up to 8192 MB	Total Memory
[1]	SODIMM Information	
MAC Address Port 1 (Module)	00:90:FB:XX:XX:XX	MAC Address (Module)
MAC Address Port 2 (Carrier)	00:01:45:XX:XX:XX	MAC Address (Carrier)
Boot Features		
Item / Submenu	Default Setting / Value	Function / Definition
NumLock	[On]	Selects the default state for NumLock during power up
Timeout	[2]	Number of seconds that Power On Self Test (POST) will wait for user input before booting
CSM Support	[Yes]	Compatibility Support Module that provides backward compatibility services for legacy BIOS devices, such as int10/int13, dependent OS.
Quick Boot	[Disable]	Enables/disables quick boot
Diagnostic Splash Screen	[Disable]	Enables/disables the diagnostic splash screen during boot.
Diagnostic Summary Screen	[Disable]	Displays the Diagnostic Summary screen during boot.

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MAIN MENU ITEMS & SUBMENUS		
Item / Submenu	Default Setting / Value	Function / Definition
BIOS Level USB	[Enable]	Enables/disables all BIOS support for the USB to reduce boot time. Note: This will prevent using a USB keyboard in Setup or a USB biometric scanner such as a finger print reader to control access to setup, but does not prevent the operating system from supporting such hardware.
Console Redirection	[Disable]	Enables/Disables Universal Console Redirection
Allow Hotkey in S4 resume	[Enable]	Enables or disables hotkey detection when the system resumes from the Hibernate state.
UEFI Boot	[Enable]	Enables the Unified Extensible Firmware Interface (UEFI). The UEFI interfaces between the OS and firmware.
Legacy Boot	[Enable]	Enables Legacy boot (USB floppy emulation)
Boot in Legacy Video Mode	[Disable]	Enable forces display adapter to switch from video mode to Text Mode 3 at the end of BIOS POST for non-UEFI boot mode (legacy boot). Some legacy software, such as DUET, requires BIOS to enter text video mode on boot.
Load OPROM	[On Demand]	Load all OPROMs or on demand, according to the boot device.

6.2 Advanced Menu

The **Advanced** menu contains a variety of complex Items and Submenus for CPU and other types of configuration.



WARNING! Assigning incorrect values to items on the following screen menus may cause system malfunction.

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Phoenix Secure Technology Setup	
Main	Advanced
<p>Setup Warning : Setting items on this screen to incorrect values may cause system to malfunction!</p> <p>Select Language [English]</p> <ul style="list-style-type: none"> ▶ CPU Configuration ▶ Uncore Configuration ▶ South Cluster Configuration ▶ Security Configuration 	<p>Item Specific Help</p>
<p>F1 Help ↑↓ Select Item +/- Change Values F9 Setup Defaults Esc Exit ↔ Select Menu Enter Select ▶ Sub-Menu F10 Save and Exit</p>	

6.2.1 Advanced Menu Items and Submenus

ADVANCED MENU ITEMS & SUBMENUS		
Item/Submenu	Default Setting	Function
CPU Configuration		
Active Processor Cores	[All]	Number of cores to enable in each processor package.
Execute Disable Bit	[Enable]	Prevents certain classes of malicious buffer overflow attacks when combined with a supporting Operating System (OS).
Limit CPUI Maximum	[Disable]	Disabled for Windows XP.
Bi-directional PROCHOT#	[Enable]	When a processor thermal sensor trips (either core), the PROCHOT# will be driven. If bi-direction is enabled, external agents can drive PROCHOT# to throttle the processor.
VTX-2	[Enable]	Enables or disables the VTX-2 Mode support.
TM1	[Enable]	Enables or disables TM1, which is a thermal monitor based on clock throttling.
DTS	[Enable]	Enables or disables the digital thermal sensor, which protects the sensor from overheating.

ADVANCED MENU ITEMS & SUBMENUS

Item/Submenu	Default Setting	Function
CPU Power Management: This subset of the CPU Configuration Submenu provides options for CPU power management		
Intel®SpeedStep™	[Enable]	Enables or disables processor performance states (P-States)
Boot Performance Mode	[Max Performance]	Selects the performance state that the BIOS will set before OS handoff.
Intel® Turbo Boost Technology	[Enable]	Enable to allow processor cores to run faster than the base operating frequency if it is operating below power, current, and temperature specification limits.
C-States	[Disable]	Enables or disables C-States
Uncore Configuration		
GOP Driver	[Enable]	Enable or disable the GOP Driver. Enabling will unload VBIOS; Disabling will load VBIOS.
Integrated Graphics Device	[Enable]	Enables or disables the Integrated Graphics Device (IGD).
Primary Display	[Auto]	Selects which of the IGD/PCI Graphics devices should be the primary display, or select SG for Switchable/Hybrid GFX.
RC6 (Render Standby)	[Enable]	Enables or disables render standby support.
PAVC	[Lite Mode]	Enables or disables protected audio/video control.
GTT Size	[2MB]	Selects the GTT size.
Aperture Size	[256 MB]	Selects the aperture size.
DVMT Pre-Allocated	[64 MB]	Selects the DVMT 5.0 pre-allocated (Fixed) graphics memory size used by the internal graphics device.
IGD Turbo	[Auto]	Selects the IGD Turbo feature, if Auto is selected. IGD Turbo will only be enabled when SOC stepping is 80 or above.
Spread Spectrum Clock	[Disable]	Enables the clock chip spread spectrum feature.
Force Lid Status	[ON]	For test: forces lid status to on or off.
BIA	[Auto]	>>Auto: GMCH Use VBIOS Default >>Level n: Enabled with Selected Aggressiveness Level.
IGD Boot Type	[eDP]	Selects preference for Integrated Graphics Device (IGD) display interface used upon system boot up.
Panel Scaling	[Auto]	Select the LCD panel scaling option used by the internal graphics device.
South Cluster Configuration		
PCI Express Configuration: This subset of the South Cluster Configuration submenu provides options for PCI Express configuration		
PCIe 0 Speed	[Auto]	Configures PCIe 0 speed.
PCIe 1 Speed	[Auto]	Configures PCIe 1 speed.
PCIe 2 Speed	[Auto]	Configures PCIe 2 speed.
PCIe 3 Speed	[Auto]	Configures PCIe 3 speed.
PCI Express Root Port 1	[Enable]	Controls the PCI Express Root Port 1 (MiniPCIe)
PCI Express Root Port 2	[Enable]	Controls the PCI Express Root Port 2 (MiniPCIe)
PCI Express Root Port 3	[Enable]	Controls the PCI Express Root Port 3 (Ethernet, Carrier)
PCI Express Root Port 4	[Enable]	Controls the PCI Express Root Port 4 (Ethernet, Carrier)
USB Configuration: This subset of the South Cluster configuration submenu provides options for USB configuration		
XHCI Link Power Management	[Enable]	Enables or disables XHCI link power management (USB 3.0)
EHCI Controller	[Enable]	Controls the USB EHCI (USB 2.0) functions. One EHCI controller must always be enabled.
USB Per-Port Control	[Enable]	Controls each of the USB ports (0~3) disabling

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ADVANCED MENU ITEMS & SUBMENUS

Item/Submenu	Default Setting	Function
USB Port #0	[Enable]	Enables or disables the USB port
USB Port #1	[Enable]	Enables or disables the USB port
USB Port #2	[Enable]	Enables or disables the USB port
USB Port #3	[Enable]	Enables or disables the USB port
Audio Configuration: This subset of the South Cluster Configuration Submenu provides options for audio configuration		
LPE Audio Support	[Disable]	Selects LPE Audio ACPI mode or PCI mode.
Audio Controller	[Enable]	Controls detection of the Azalia device. Disabled: Azalia will be unconditionally disabled. Enabled: Azalia will be unconditionally enabled.
SATA Drives: This subset of the South Cluster Configuration submenu provides options for SATA drives		
Chipset SATA	[Enable]	Enables or disables the chipset SATA controller. The chipset SATA controller supports both internal SATA ports (up to 3Gb/s supported per channel)
SATA Test Mode	[Disable]	Enables or disables test mode.
Chipset SATA Mode	[AHCI]	IDE: Compatibility mode disables AHCI. AHCI: Supports advanced SATA features such as Native Command Queuing. Warning: OS may not boot if this setting is changed after OS install.
SATA Port 0 Hot Plug Capability	[Enable]	If enabled, SATA port will be reported as Hot Plug capable.
SATA Port 1 Hot Plug Capability	[Enable]	If enabled, SATA port will be reported as Hot Plug capable.
LAN Configuration: This subset of the South Cluster configuration Submenu provides options for LAN configuration		
PXE ROM	[Disable]	Enables or disables PXE Option ROM execution for onboard LAN
Miscellaneous Configuration: This subset of the South Cluster Configuration submenu provides options for miscellaneous configuration		
State After G3	[SO State]	Specifies in which state to begin when power is re-applied after a power failure (G3 state).
SMM Lock	[Enable]	Enables or disables the SMM Lock feature. This locks the SMRAM and disables the SMM driver.
PCI MMIO Size	[GB]	Sets the PCIO MMIO size.

6.2.2 Security Configuration Items and Submenus

SECURITY CONFIGURATION ITEMS & SUBMENUS

Item/Submenu	Default Setting	Function/Definition
TXE FW Version (Read Only)	1.0.2.1067	Example Only
TXE FW Capabilities (Read Only)	A0001040	Example Only
TXE FW Features (Read Only)	A0001040	Example Only
TXE FW OEM Tag (Read Only)	00000000	Example Only
TXE Firmware Mode (Read Only)	Normal	Example Only
TXE File System Integrity Value	0	Example Only

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SECURITY CONFIGURATION ITEMS & SUBMENUS

Item/Submenu	Default Setting	Function/Definition
TXE	[Enable]	
TXE HMRFPD	[Disable]	
TXE Firmware Update	[Enable]	
TXE EOP Message	[Enable]	
TXE Unconfiguration Perform		Reverts TXE settings to factory defaults

6.3 Others Menu

Phoenix Secure Technology Setup

Main Advanced Others Security Boot Exit

- ▶ SIO Configuration
- ▶ Hardware Monitor
- ▶ System Information

F1 Help **↑↓** Select Item
Esc Exit **→** Select Menu

+/- Change Values
Enter Select ▶ Sub-Menu

F9 Setup Defaults
F10 Save and Exit

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6.3.1 SIO Configuration Items and Submenus

SIO CONFIGURATION ITEMS & SUBMENUS		
Item/Submenu	Default Setting	Function
Serial 1		
I/O Address	[3F0]	Modifies the input serial 1 I/O address range from 0x100 to 0xFFFF8
IRQ	[4]	Modifies the input serial 1 IRQ range from 1 to 15
Mode [RS232]	N/A	Selects the serial 1 mode
SLEW	[not Limited]	Selects the serial 1 SLEW
BRG	[Normal]	Select Serial 1 BRG High=33.333 MHz Normal=1.8432MHz
Mode [RS422]	N/A	Selects the serial 1 mode
Termination	[No Termination]	Selects UART termination
SLEW	[not Limited]	Selects the serial 1 SLEW
BRG	[Normal]	Select Serial 1 BRG High=33.333 MHz Normal=1.8432MHz
Mode [RS485]	N/A	Selects the serial 1 mode
Termination	[No Termination]	Selects UART termination
SLEW	[not Limited]	Selects the serial 1 SLEW
BRG	[Normal]	Select Serial 1 BRG High=33.333 MHz Normal=1.8432MHz
Mode [Loopback]	N/A	Selects the serial 1 mode
Termination	[No Termination]	Selects UART termination
SLEW	[not Limited]	Selects the serial 1 SLEW
[BRG]	[Normal]	Select Serial 1 BRG High=33.333 MHz Normal=1.8432MHz
Serial 2		
I/O Address	[2F8]	Modifies the input serial 2 I/O address range from 0x100 to 0xFFFF8
IRQ	[3]	Modifies the input serial 2 IRQ range from 1 to 15
Mode [RS232]	N/A	Selects the serial 2 mode
SLEW	[not Limited]	Selects the serial 2 SLEW
BRG	[Normal]	Select Serial 2 BRG High=33.333 MHz Normal=1.8432MHz
Mode [RS422]	N/A	Selects the serial 2 mode
Termination	[No Termination]	Selects UART termination
SLEW	[not Limited]	Selects the serial 2 SLEW
BRG	[Normal]	Select Serial 2 BRG High=33.333 MHz Normal=1.8432MHz
Mode [RS485]	N/A	Selects the serial 2 mode
Termination	[No Termination]	Selects UART termination
SLEW	[not Limited]	Selects the serial 2 SLEW

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SIO CONFIGURATION ITEMS & SUBMENUS		
Item/Submenu	Default Setting	Function
BRG	[Normal]	Select Serial 2 BRG High=33.333 MHz Normal=1.8432MHz
Mode [Loopback]	N/A	Selects the serial 2 mode
Termination	[No Termination]	Selects UART termination
SLEW	[not Limited]	Selects the serial 2 SLEW
BRG	[Normal]	Select Serial 2 BRG High=33.333 MHz Normal=1.8432MHz
IO60		
I/O Address	[3E8]	Modifies the input serial 3 I/O address range from 0x100 to 0xFFFF8
IRQ	[6]	Modifies the input serial 3 IRQ range from 1 to 15
GPS		
I/O Address	[2E8]	Modifies the input serial 4 I/O address range from 0x100 to 0xFFFF8
IRQ	[7]	Modifies the input serial 4 IRQ range from 1 to 15
Watch Dog Timer		
Watch Dog Timer	[Disable/Enable]	Enables or disables the watch dog timer
Timer Unit	[Second/Minute]	If Watch Dog Timer is Enabled, choose between Second and Minute
Timer Value	255	255 Seconds or 255 Minutes, depending upon the choice of Timer Unit
LCD Configuration		
LCD Panel Type	[1024 x 768 NXP Generic]	Selects the LCD panel type
Bpp Select	[24 Bpp]	Selects the Bpp Type

6.3.2 Hardware Monitor Items and Submenus

HARDWARE MONITOR ITEMS & SUBMENUS (Read Only)		
Item/Submenu	Default Setting	Function
CPU Temp	N/A	Displays the temperature of the CPU in Celcius
CPU Fan	N/A]	N/A if no external fan is connected
VCORE	N/A	Displays the voltage for this selection
3.3 V	N/A	Displays the voltage for this selection
5.0V	N/A	Displays the voltage for this selection
12.0V	N/A	Displays the voltage for this selection
1.35V	N/A	Displays the voltage for this selection

6.3.3 APM Configuration Items and Submenus

APM CONFIGURATION ITEMS & SUBMENUS		
Item/Submenu	Default Setting	Function
Power On By RTC Alarm	[Disable]	If enabled, allows the SBC to be powered on by an RTC alarm.
Wake on Lan1	[Enable]	

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6.4 Security Menu

The menu options as depicted below are prior to changes by the user. Once the user sets a Supervisor password, some of the menu items will no longer appear as grey text.

Phoenix Secure Technology Setup					
Main	Advanced	Others	Security	Boot	Exit
<div>Supervisor Password is: Cleared</div> <div>User Password is: Cleared</div> <div>Set Supervisor Password [Enter]</div> <div>Supervisor Hint String []</div> <div>Set User Password [Enter]</div> <div>Set User Password []</div> <div>Min. password length [1]</div> <div>Authenticate Uer on Boot [Disable]</div> <div>HDD Security Status</div> <div>No HDD detected</div> <div>Trusted Platform Module (TPM)</div> <div>TPM not detected</div>				Item Specific Help	
				Set or clear the Supervisor account's password.	

F1	Help	↑↓	Select Item	+/-	Change Values	F9	Setup Defaults
Esc	Exit	←	Select Menu	Enter	Select ► Sub-Menu	F10	Save and Exit

6.4.1 Security Menu Items and Submenus

SECURITY ITEM MENUS & SUBMENUS		
Item/Submenu	Default Setting	Function
Supervisor Password is:	Cleared	Read only.
User Password is:	Cleared	Read only.
Set Supervisor Password	[Enter]	Press Enter to set or clear the supervisor account's password. Press Esc to exit without making changes.
Supervisor Hint String	[]	Press Enter to type a hint for the Supervisor password. If you forget your password, the answer to your hint will help you recover the password.
Set User Password	[Enter]	Press Enter to set or clear the user password. Press Esc to exit without making changes
User Hint String	[]	Press Enter to type a hint for the User password. If you forget your password, the answer to your hint will help you recover the password.
Min. password length	[1]	Sets the minimum number of characters for your password (1-20).

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SECURITY ITEM MENUS & SUBMENUS		
Item/Submenu	Default Setting	Function
Authenticate User on Boot	[Disable]	Enables or disables user authentication prompt on boot.
HDD Security Status		If no hard disk drive is detected, this is blank.
No HDD detected		This is the display when no hard disk drive is detected.
Trusted Platform Module (TPM)		
TPM not detected		

6.5 Boot Menu

Phoenix Secure Technology Setup					
Main	Advanced	Others	Security	Boot	Exit
<p>Boot Priority Order</p> <ol style="list-style-type: none"> 1. USB HDD: 2. USB CD: 3. USB FDD: 4. ATAPI CD: 5. ATA HDD0: 6. ATA HDD1: 7. Internal Shell 8. PCI LAN: 					<p>Item Specific Help</p> <p>Keys used to view or configure devices: ↑ and ↓ arrows Select a device. '+' and '-' move the device up or down. 'Shift + 1' enables or disables a device. 'Del' deletes an unprotected.</p>
<p>F1 Help ↑↓ Select Item +/- Change Values</p> <p>Esc Exit → Select Menu Enter Select ► Sub-Menu</p>			<p>F9 Setup Defaults</p> <p>F10 Save and Exit</p>		

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6.5.1 Boot Menu Items and Submenus

BOOT MENU ITEMS & SUBMENUS		
Item/Submenu	Default Setting	Function
Boot Priority Order		
USB HDD:	N/A	<p>Once selected, use the + or – key to change the order in which the selected device boots.</p> <p>Keys used to view or configure devices: Up and down arrows select a device. ‘+’ and ‘-’ move the device up or down. ‘Shift + 1’ enables or disables a device. ‘Del’ deletes an unprotected device.</p>
USB CD:		
USB FDD:	N/A	
ATAPI CD:	N/A	
ATA HDD0:	N/A	
ATA HDD1:	N/A	
Internal Shell	N/A	
PCI LAN:	N/A	

6.6 Exit Menu

Phoenix Secure Technology Setup	
Main Advanced Others Security Boot Exit	
Exit Saving Changes Exit Discarding Changes Load Setup Defaults Discard Changes Save Changes	Item Specific Help Equal to F10, save all changes of all menus, then exit setup configure driver. Finally resets the system automatically.
F1 Help ↑ Select Item +/- Change Values F9 Setup Defaults Esc Exit → Select Menu Enter Select ► Sub-Menu F10 Save and Exit	

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6.6.1 Exit Menu Items and Submenus

EXIT MENU ITEMS & SUBMENUS		
Item/Submenu	Default Setting	Function
Exit Saving Changes	N/A	Saves all changes, and then exits setup.
Exit Discarding Changes	N/A	Exits setup without changes.
Load Setup Defaults	N/A	Equal to F9. Loads standard default values.
Discard Changes	N/A	Load the original value of this boot time, not the default Setup value.
Save Changes	N/A	Save all changes of all menus, but do not restart the system.

7.0 Cables and Software Drivers

Go to www.winsystems.com for cable information and software drivers.

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8.0 Mechanical Drawings

8.1 Top Side Component Illustration with Dimensions

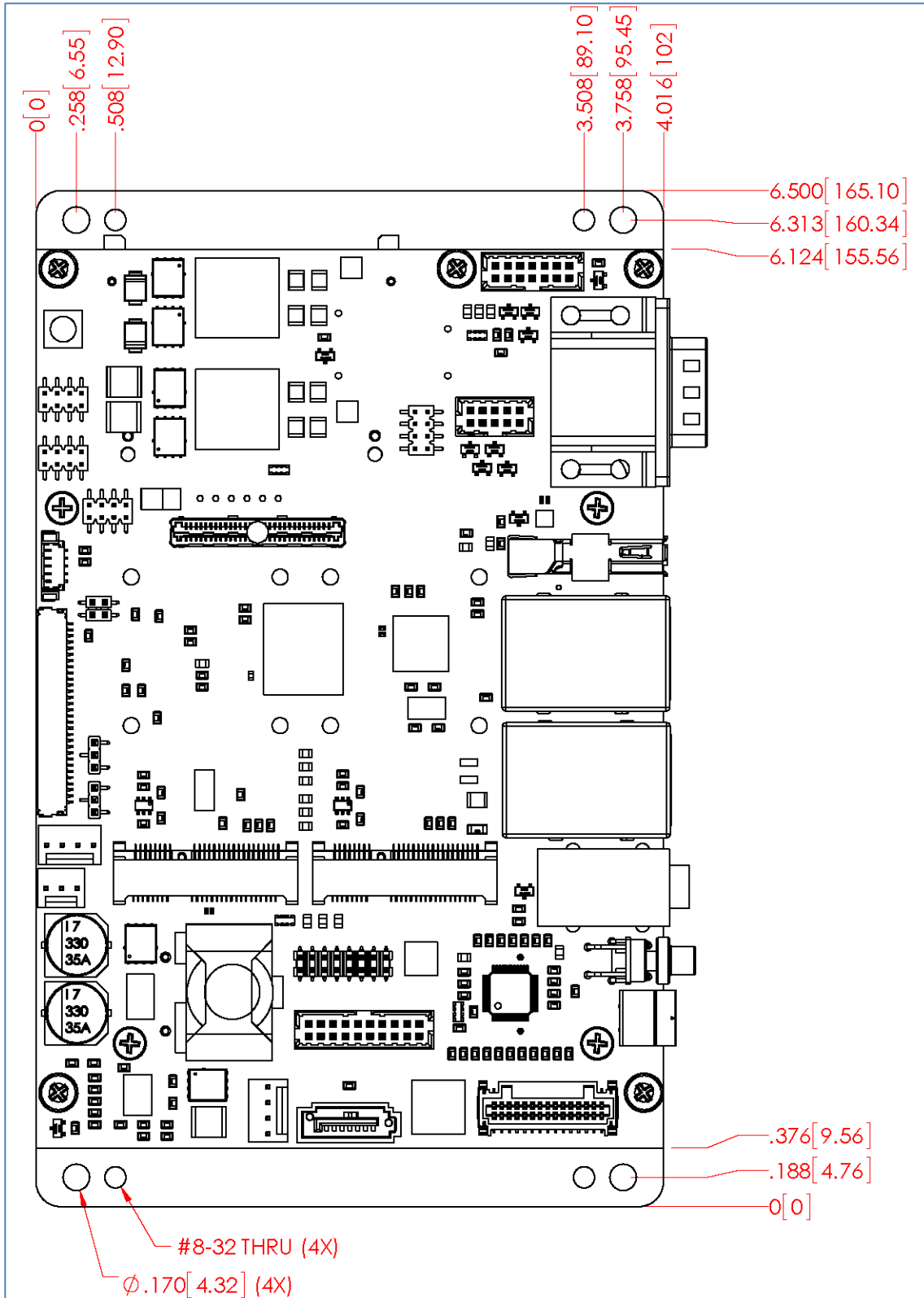


Figure 8.1-1. Top Side Component Illustration with Dimensions.

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8.2 Edge View Component Illustration

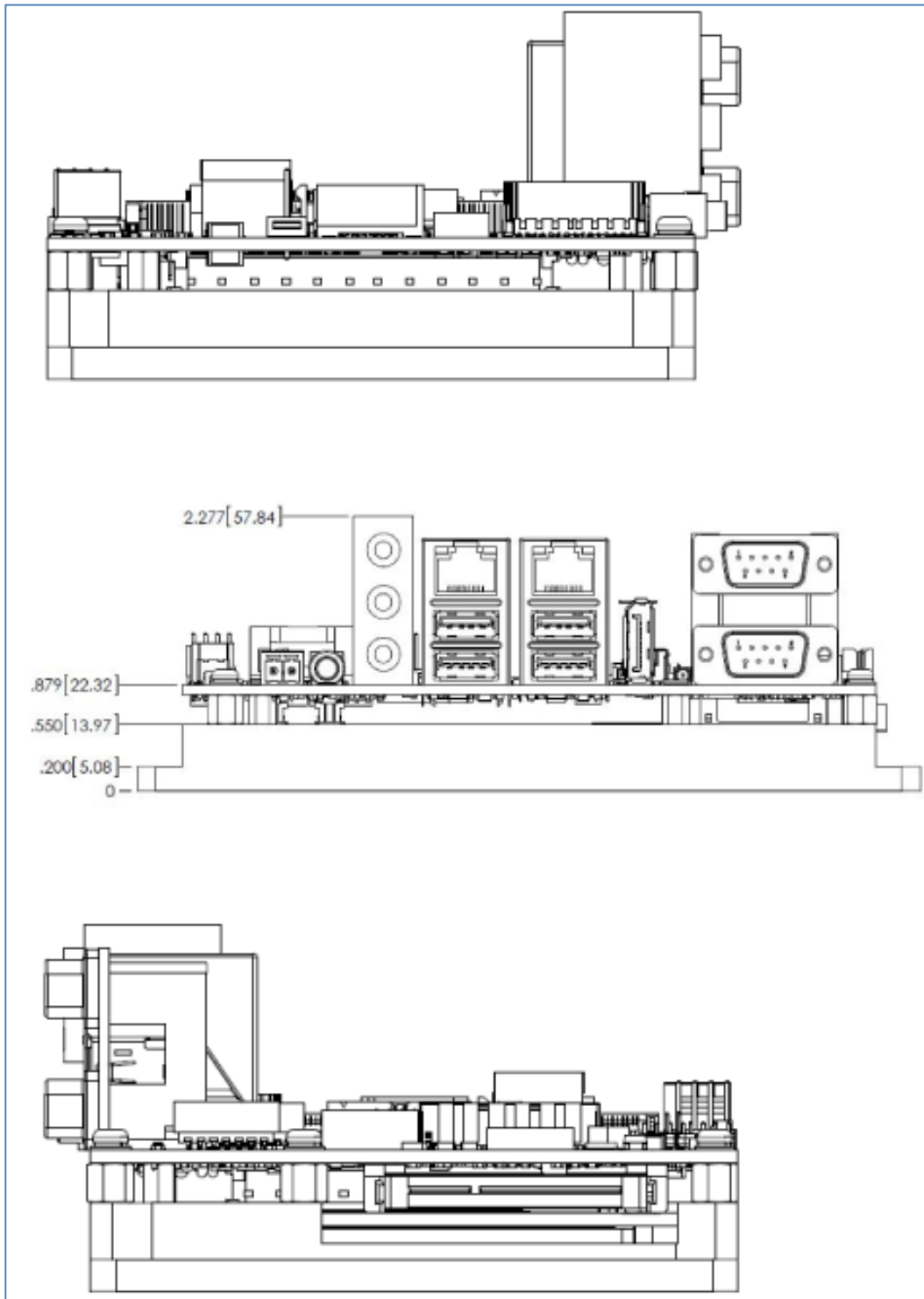


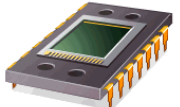


Figure 8.2-1. Edge Views Component Illustration.

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Appendix A – Best Practices

A.1 Power Supply



Power Supply	
	Avoid Electrostatic Discharge (ESD). Only handle the SBC and other bare electronics when electrostatic discharge (ESD) protection is in place. Having a wrist strap and a fully grounded workstation is the minimum ESD protection required before the ESD seal on the product bag is broken.
	Power Supply Budget. Evaluate your power supply budget. It is usually good practice to budget 2X the typical power requirement for all of your devices.
	Zero-Load Power Supply. Use a zero-load power supply whenever possible. A zero-load power supply does not require a minimum power load to regulate. If a zero-load power supply is not appropriate for your application, then verify that the single board computer's typical load is no lower than the power supply's minimum load. If the single board computer does not draw enough power to meet the power supply's minimum load, the power supply will not regulate properly and can cause damage to the SBC.
	Use Proper Power Connections (Voltage). When verifying the voltage, you should always measure it at the power connector on the SBC. Measuring at the power supply does not account for voltage drop through the wire and connectors. The single board computer requires +10 to +50VDC to operate. Verify the power connections. Incorrect voltages can cause catastrophic damage. Populate all power and ground connections. Most single board computers will have multiple power and ground pins, and all of them should be populated. The more copper connecting the power supply to the single board computer the better.
	Adjusting Voltage. If you have a power supply that will allow you to adjust the voltage, it is a good idea to set the voltage at the power connector of the SBC to 5.1V. The SBC can tolerate up to 5.25V, so setting your power supply to provide 5.1V is safe and allows for a small amount of voltage drop that will occur over time as the power supply ages and the connector contacts oxidize.
	Power Harness. Minimize the length of the power harness. This will reduce the amount of voltage drop between the power supply and the single board computer.
	Gauge Wire. Use the largest gauge wire that you can. Most connector manufacturers have a maximum gauge wire they recommend for their pins. Try going one size larger; the extra copper will help your system perform more stable over time.
	Pin Contacts. Often the pin contacts used in cabling are not given enough attention. The ideal choice for a pin contact would include a design similar to Molex or Trifurcon design, which provides three distinct points to maximize the contact area and improve connection integrity in high shock and vibration applications.

A.2 Power Down

Make sure the system is **completely off/powered down** before connecting anything to the motherboard.

Power Down	
	Power Supply OFF. The power supply should always be off before it is connected to the single board computer.
	I/O Connections OFF. I/O Connections should also be off before connecting them to the single board computer or any I/O cards. Connecting hot signals can cause damage whether the single board computer is powered or not.

A.3 Mounting and Protecting the Single Board Computer


Mounting and Protecting the SBC	
	<p>Do Not Bend or Flex the SBC. Never bend or flex the single board computer. Bending or flexing can cause irreparable damage. Single board computers are especially sensitive to flexing or bending around Ball-Grid-Array (BGA) devices. BGA devices are extremely rigid by design and flexing or bending the single board computer can cause the BGA to tear away from the printed circuit board.</p>
	<p>Mounting Holes. The mounting holes are plated on the top, bottom and through the barrel of the hole and are connected to the single board computer's ground plane. Traces are often routed in the inner layers right below, above or around the mounting holes.</p> <ul style="list-style-type: none"> • Never use a drill or any other tool in an attempt to make the holes larger. • Never use screws with oversized heads. The head could contact nearby components causing a short or physical damage. • Never use self-tapping screws; they will compromise the walls of the mounting hole. • Never use oversized screws that cut into the walls of the mounting holes. • Always use all of the mounting holes. By using all of the mounting holes, you will provide the support the single board computer needs to prevent bending or flexing.
	<p>Plug or Unplug Connectors Only on Fully Mounted Boards. <u>Never</u> plug or unplug connectors on a board that is not fully mounted. Many of the connectors fit rather tightly and the force needed to plug or unplug them could cause the single board computer to be flexed.</p>
	<p>Avoid cutting the SBC. <u>Never</u> use star washers or any fastening hardware that will cut into the single board computer.</p>
	<p>Avoid Over tightening of Mounting Hardware. Causing the area around the mounting holes to compress could damage interlayer traces around the mounting holes.</p>
	<p>Use Appropriate Tools. <u>Always</u> use tools that are appropriate for working with small hardware. Large tools can damage components around the mounting holes.</p>
	<p>Placing the SBC on Mounting Standoffs. Be careful when placing the single board computer on the mounting standoffs. Sliding the board around until the standoffs are visible from the top can cause component damage on the bottom of the single board computer.</p>
	<p>Avoid Conductive Surfaces. <u>Never</u> allow the single board computer to be placed on a conductive surface. Almost all single board computers use a battery to back up the clock-calendar and CMOS memory. A conductive surface such as a metal bench can short the battery causing premature failure.</p>

A.4 Conformal Coating

Applying conformal coating to a WinSystems product will not in itself void the product warranty, if it is properly removed prior to return. Coating may change thermal characteristics and impedes our ability to test, diagnose, and repair products. Any coated product sent to WinSystems for repair will be returned at customer expense and no service will be performed.

A.5 Operations/Product Manuals

Every board computer has an Operations manual or Product manual.

Operations/Product Manuals	
	<p>Manual Updates. Operations/Product manuals are updated often. Periodically check the WinSystems website (www.winsystems.com) for revisions.</p>
	<p><u>Always</u> check the pin out and connector locations in the manual before plugging in a cable. Many single board computers will have identical headers for different functions and plugging a cable into the wrong header can have disastrous results.</p>
	<p>Contact an Applications Engineer with questions. If a diagram or chart in a manual does not seem to match your board, or if you have additional questions, contact your Applications Engineer.</p>

Warranty Information

<http://www.winsystems.com/warranty.cfm>

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1. To obtain service under this warranty, obtain a return authorization number. In the United States, contact the WinSystems' Service Center for a return authorization number. Outside the United States, contact your local sales agent for a return authorization number.
2. You must send the product postage prepaid and insured. You must enclose the products in an anti-static bag to protect from damage by static electricity. WinSystems is not responsible for damage to the product due to static electricity.